

CLAIMS

1. A molding system for molding a micro pattern structure comprising
a mold;
5 a mold insert having a micro pattern, the mold insert being fixed to the mold; and
a micro heating element having a micro heater between the mold and the mold insert,
the micro heater being formed in an integrated manner by using a MEMS process;
wherein the amount of Joule's heat produced by the micro heater is controlled by
controlling the amount of electricity applied to the micro heater so as to control a temperature
10 of the mold insert.
2. The molding system for molding the micro pattern structure as claimed in
claim 1,
wherein the micro heating element comprises a micro temperature sensor formed in
15 an integrated manner by a MEMS process, and
the micro temperature sensor detects the temperature of the mold insert.
3. The molding system for molding the micro pattern structure as claimed in
claim 2,
20 wherein the micro temperature sensor is made out of a material whose resistance
value changes with temperature.
4. The molding system for molding the micro pattern structure as claimed in
claim 1,
25 wherein the micro heating element comprises a micro pressure sensor formed in an
integrated manner by a MEMS process, and
the micro pressure sensor detects a pressure applied by the mold insert.
5. The molding system for molding the micro pattern structure as claimed in
30 claim 4,
wherein the micro pressure sensor is made of a piezoelectric material.
6. The molding system for molding the micro pattern structure as claimed in any
one of claims 2 to 5,

wherein the micro heater and the micro sensor are fabricated by a lift-off process.

7. The molding system for molding the micro pattern structure as claimed in any one of claims 2 to 5,

5 wherein the micro heating element has the plurality of the micro heaters and the plurality of the micro sensors, to control local temperatures of the mold insert .

8. The molding system for molding the micro pattern structure as claimed in any one of claims 2 to 5,

10 wherein the micro heater and the micro sensor are formed on a back side of the mold insert.

9. The molding system for molding the micro pattern structure as claimed in any one of claims 2 to 5,

15 wherein the Joule's heat produced by the micro heater is controlled based on a value detected by the micro sensor.

10. The molding system for molding the micro pattern structure as claimed in any one of claims 2 to 5,

20 wherein values detected by the micro sensor are organized to form a database and the database is used in a following molding process.

11. The molding system for molding the micro pattern structure as claimed in any one of claims 1 to 5,

25 wherein the molding system further comprises an insulator for insulating the micro heater from the mold insert and the mold.

12. A method for fabricating a mold insert for molding a micro pattern structure, the mold insert being heated by a micro heater, the method comprising the steps of:

30 coating a photoresist on a back side of either the mold insert or a plate fixed onto the mold insert;

patterning the photoresist by removing a part of the photoresist corresponding to the micro heater using a lithography process;

coating a material for forming the micro heater; and

removing the residual photoresist.

13. The method for fabricating the mold insert for molding the micro pattern structure as claimed in claim 12, further comprising the steps of:

5 coating a photoresist on the back side of the mold insert or the plate fixed onto the mold insert;

patterning the photoresist by removing a part of the photoresist corresponding to a micro temperature sensor using a lithography process;

coating a material for forming the micro temperature sensor; and

10 removing the residual photoresist.

14. The method for fabricating the mold insert for molding the micro pattern structure as claimed in claim 13,

15 wherein the micro temperature sensor is made of a material whose resistance value changes with temperature.

15. The method for fabricating the mold insert for molding the micro pattern structure as claimed in claim 13,

20 wherein the material for forming the micro heater is the same as the material for forming the micro temperature sensor, and

each step as recited in claim 13 is synchronized with each corresponding step as recited in claim 12.

16. The method for fabricating the mold insert for molding the micro pattern structure as claimed in claim 12, further comprising the steps of:

25 coating a photoresist on the back side of the mold insert or the plate fixed onto the mold insert;

patterning the photoresist by removing a part of the photoresist corresponding to a micro pressure sensor using a lithography process;

30 coating a material for forming the micro pressure sensor; and

removing the residual photoresist.

17. The method for fabricating the mold insert for molding the micro pattern structure as claimed in claim 16,

wherein the micro pressure sensor is made of a piezoelectric material.

18. The method for fabricating the mold insert for molding the micro pattern structure as claimed in any one of claims 12 to 17, further comprising an initial step of:

5 coating an insulating material on the back side of the mold insert or the plate fixed onto the mold insert.

19. The method for fabricating the mold insert for molding the micro pattern structure as claimed in any one of claims 12 to 17, further comprising the final step of:

10 coating an insulating material which can be patterned by a lithography process; patterning the insulating material by removing a part of the insulating material for a following wiring work using a lithography process; and wiring the micro heating element.